1971 OPERATING SUMMARY

BURLINGTON D. L.

WATER POLLUTION CONTROL PLANT

Water management in Ontario

Ontario
Water Resources
Commission

We are pleased to submit for your consideration a summary of operation during 1971 of the water pollution control plant serving your community.

This operating summary contains parameters normally used to measure plant performance and loading, as well as relevant cost data. Because of the concern over eutrophication of our lakes and of the requirement, in many parts of Ontario, to remove the major contributing factor, results of analysis for phosphorus appear in this summary.

D.S. Caverly,
General Manager.

D.A. McTavish, P. Eng.,
Director,
Division of Plant Operations.

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Operations Engineer
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135 St. Clair Avenue West
Toronto 195

BURLINGTON-DRURY LANE

WATER POLLUTION CONTROL PLANT

operated for

THE TOWN OF BURLINGTON

by the

ONTARIO WATER RESOURCES COMMISSION

1971 ANNUAL OPERATING SUMMARY

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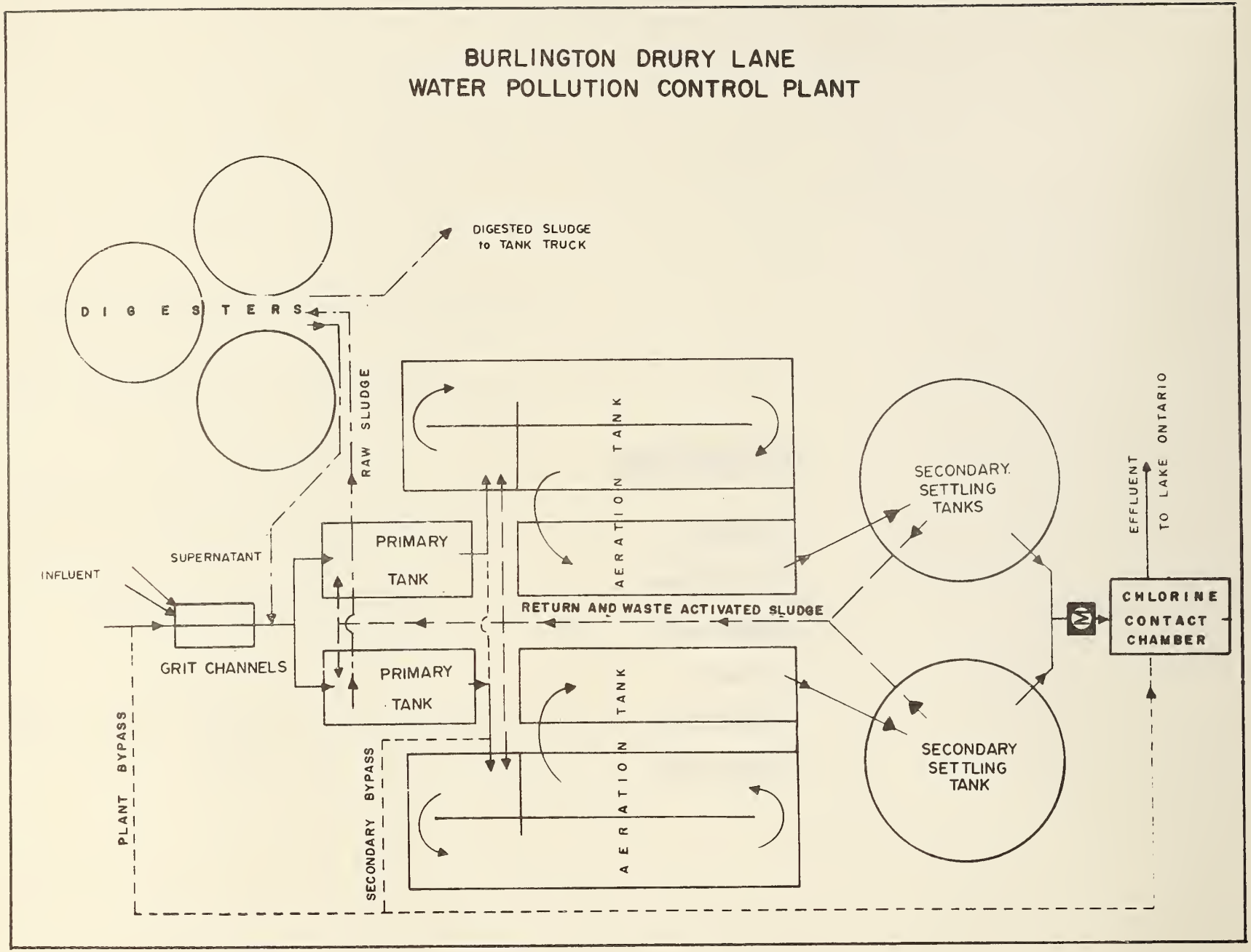

BURLINGTON DRURY LANE
WATER POLLUTION CONTROL PLANT
DIGESTED SLUDGE
to TANK TRUCK
D I G E S T E R S
RAW SLUDGE
AERATION TANK
SECONDARY
SETTLING
TANKS
EFFLUENT
TO LAKE ONTARIO
SUPERNATANT
INFLUENT
PRIMARY
TANK
RETURN AND WASTE ACTIVATED SLUDGE
CHLORINE
CONTACT
CHAMBER
GRIT CHANNELS
PRIMARY
TANK
AERATION TANK
SECONDARY
SETTLING
TANK
PLANT BYPASS
SECONDARY BYPASS

DESIGN DATA

PROJECT NO.	2-0051-60
TREATMENT	Activated Sludge
DESIGN FLOW	2.5 mgd
DESIGN POPULATION	30,000
BOD - Raw Sewage	200 mg/l
- Removal	90%
SS - Raw Sewage	180 mg/l
- Removal	90%

PRIMARY TREATMENT

Screening

1" bar screens

Grit Removal

Type: Grit channels
Retention: 0.8 min

Primary Sedimentation

Type: Walker Process
Size: Two 49.3' x 18' x 12.25' (135,700 gal)
Retention: 1.3 hr
Loading: Surface, 1400 gal/ft^2/day
Weir, 17,100 gal/ft/day

SECONDARY TREATMENT

Aeration Tanks

Type: Diffused air; triple-pass
Size: Two tanks, each with
2 passes 118' x 18' x 10.7'
1 pass 85.5' x 18' x 10.7'
(833,000 gal. total)
Retention: 8.0 hours

Air Supply

One Sutorbilt - 1500 cfm
Two Roots-Connerville - 750 cfm

Diffusers - (each tank)

1) 132 Schumacher Brandel tubes in first two passes

2) 41 Spargers on 2' centres in third pass

Secondary Sedimentation

Type: Rex Unitube Tow-Bro
Size: Two 50' dia x 10.6' swd (260,000 gal)
Retention: 2.5 hr
Loading: Surface, 1000 gal/ft^2/day
Weir, 8500 gal/ft/day

CHLORINATION

Type: Kent

Chlorine Contact Chamber

- in outfall

OUTFALL

- to Lake Ontario

SLUDGE HANDLING

Digestion System

Type: Two-stage

Primary --
Size: Two 40' dia tanks (313,000 gal total)
Loading: 2.7 lb/ft^3/mo

Secondary --
Size: One 40' dia tank (143,000 gal)
Loading Total: 1.9 lb/ft^3/mo

'71 Review

GENERAL

Plant flows were not recorded until May of 1971 when new metering equipment was installed. The total flow for the year, based on extrapolation of flows for the period May to December was 584 million gallons, relatively unchanged from 1969 flows.

EXPENDITURES

The 1971 operating expenditures were $43,733.37, an increase of about 14 percent from the 1970 costs.

PLANT EFFICIENCY

The average raw sewage strength was 209 mg/l BOD and 249 mg/l suspended solids as compared to 219 mg/l BOD and 257 mg/l suspended solids in the previous year. The average removal efficiency of 92 percent for BOD was unchanged from 1970, but the removal efficiency for suspended solids improved from 92 to 95 percent. The effluent quality improved over 1970 and averaged 16 mg/l BOD and 12 mg/l suspended solids.

SLUDGE DIGESTION and DISPOSAL

A total volume of 1.70 million gallons of raw sludge was pumped to the digester, relatively unchanged from 1970. The average raw sludge total solids concentration was 8.3 percent. The total volume of liquid digested sludge hauled from the plant was 1388 cubic yards.

CONCLUSIONS

In general, the plant operated satisfactorily during the year and the effluent quality improved over 1970. Plant flows were again recorded following the installation of new flow measuring equipment in May of 1971. The plant operated at an average of 64 percent of design flow capacity.

PROJECT COSTS

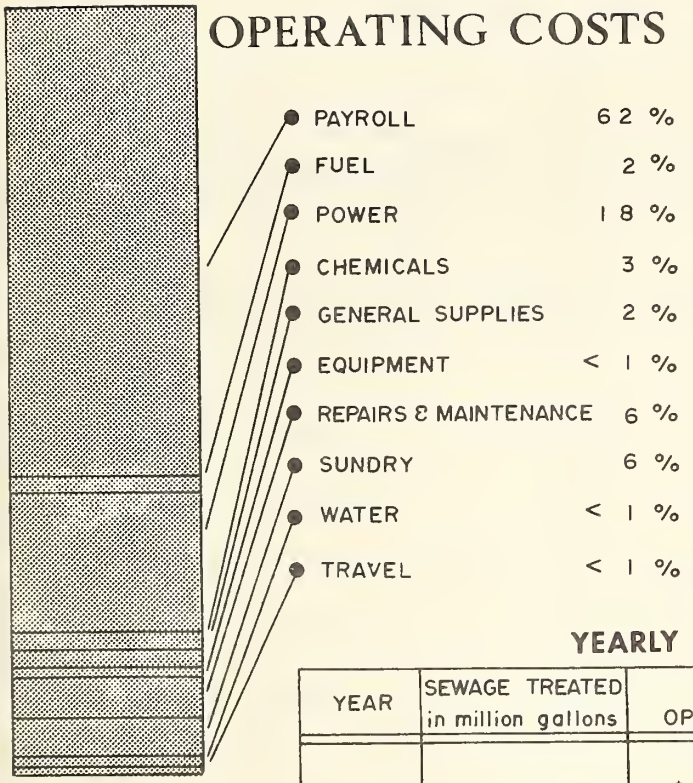
NET CAPITAL COST (Final)	$676,033.78
DEDUCT - Portion financed by CMHC/MDLB (Final)	41,721.91
Long Term Debt to OWRC	$634,311.87
Debt Retirement Balance at Credit (Sinking Fund) December 31, 1971	$322,123.72
Net Operating	$ 43,733.37
Debt Retirement	9,479.00
Reserve	2,205.07
Interest Charged	35,579.08
TOTAL	$ 90,996.52

RESERVE ACCOUNT

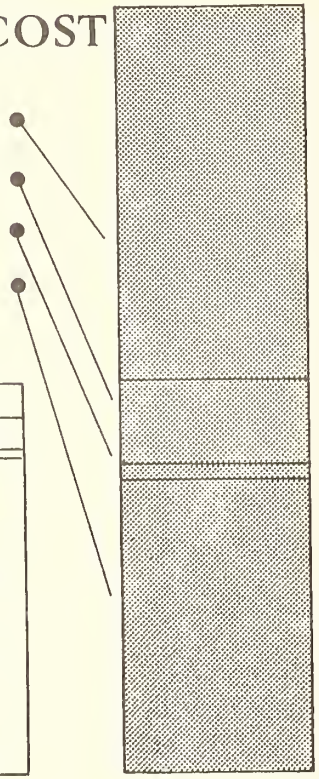
Balance @ January 1, 1971	$ 41,002.70
Deposited by Municipality	2,205.07
Interest Earned	2,695.06
	$ 45,902.83
Less Expenditures	-
Balance @ December 31, 1971	$ 45,902.83

1971 COSTS

OPERATING COSTS



TOTAL ANNUAL COST



YEARLY OPERATING COSTS

YEAR	SEWAGE TREATED in million gallons	TOTAL OPERATING COSTS	TREATMENT COSTS $ per million gal	TREATMENT COSTS ¢ per lb BOD
1967	596.29	$41,183.66	$69.07	3 cents
1968	568.20	42,055.65	74.02	3 cents
1969	594.90*	42,152.71	70.86	4 cents
1970	-	38.417.86	-	-
1971	584.0	43,733.37	74.90	3 cents

MONTHLY OPERATING COSTS

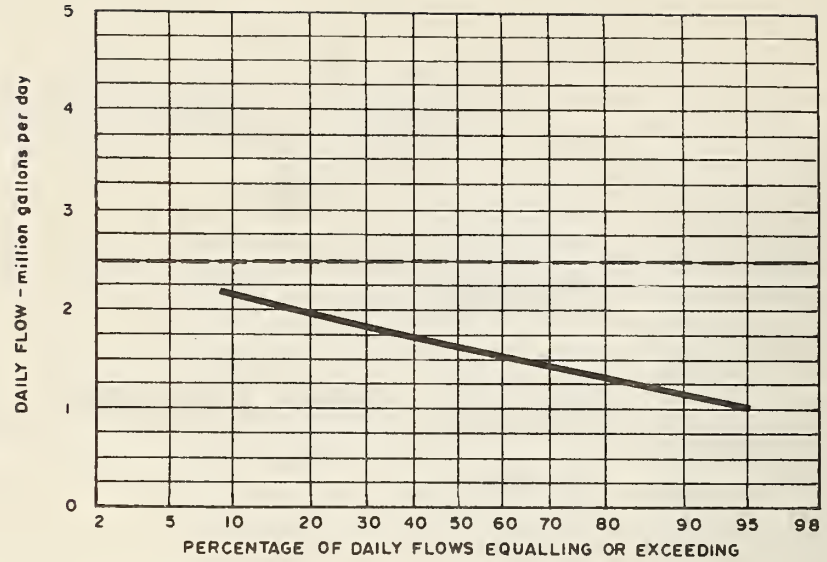
MONTH	TOTAL EXPENDITURE	REGULAR PAYROLL	CASUAL PAYROLL	FUEL	POWER	CHEMICALS	GENERAL SUPPLIES	EQUIPMENT	REPAIRS and MAINTENANCE	SUNDRY*	WATER	TRAVEL
JAN	1810.80	1720.77	-	76.65	-	-	13.38	-	-	-	-	-
FEB	2776.20	1782.59	-	173.81	546.39	-	9.35	-	-	235.04	29.02	-
MAR	3482.77	2479.36	-	148.26	548.54	-	51.46	-	165.72	63.07	26.36	-
APR	2005.90	1127.61	-		650.37	-	57.50	-	40.34	93.65	36.43	-
MAY	3305.66	2040.48	190.75	74.97	611.33	-	43.12	-	279.32	45.22	20.47	-
JUNE	4244.53	2100.76	(190.75)	-	622.40	755.05	42.73	82.75	708.29	101.21	21.99	-
JULY	3617.45	1922.74	497.00	-	657.93	5.93	36.87	-	196.09	297.47	21.42	-
AUG	2888.13	1557.40	352.02	-	788.39	-	79.48	-	73.69	16.49	20.66	-
SEPT	5225.14	2225.41	305.31	-	715.06	278.25	-	-	-	1675.13	25.98	-
OCT	5385.66	3650.39	43.24	-	720.52	556.50	321.72	-	40.95	31.49	20.85	-
NOV	4318.33	2598.06	-	178.80	713.85	(13.84)	94.56	-	408.34	308.59	29.97	-
DEC	4672.80	2662.72	(19.80)	270.23	1196.71	-	64.18	-	572.28	32.16	55.57	(161.25)
TOTAL	43733.37	25868.29	1177.77	922.72	7771.49	1581.89	814.35	82.75	2485.02	2881.52	308.72	(161.25)

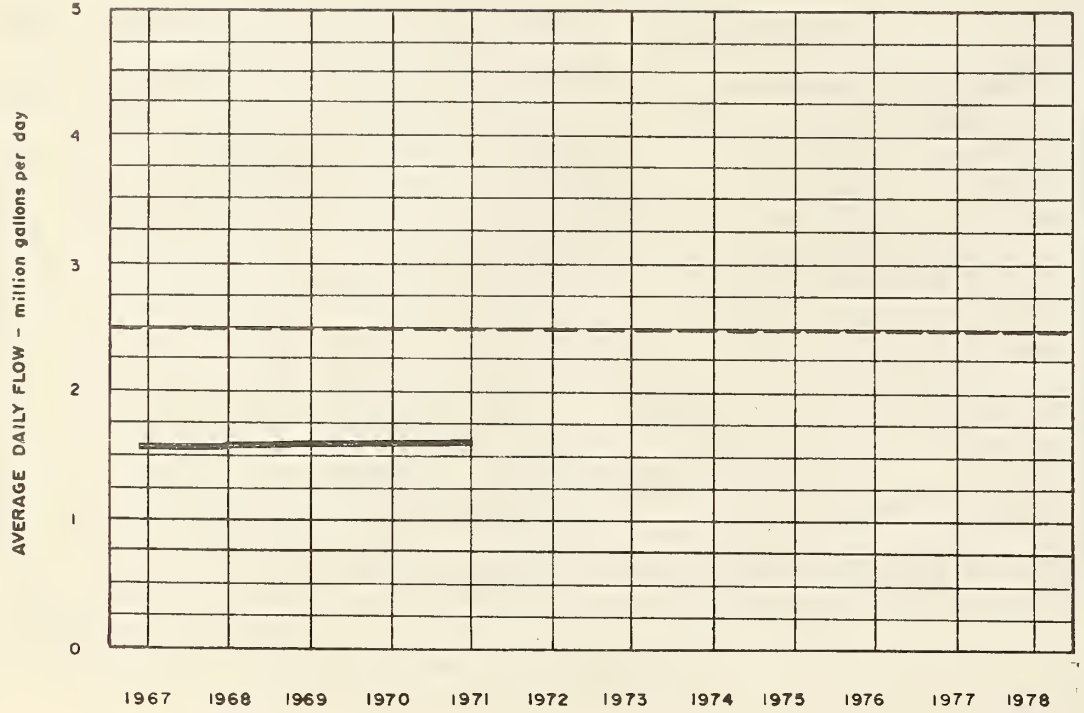
Brackets indicate credit.

* Sundry includes sludge haulage costs of $1,172.03

PROCESS DATA

FLOWS





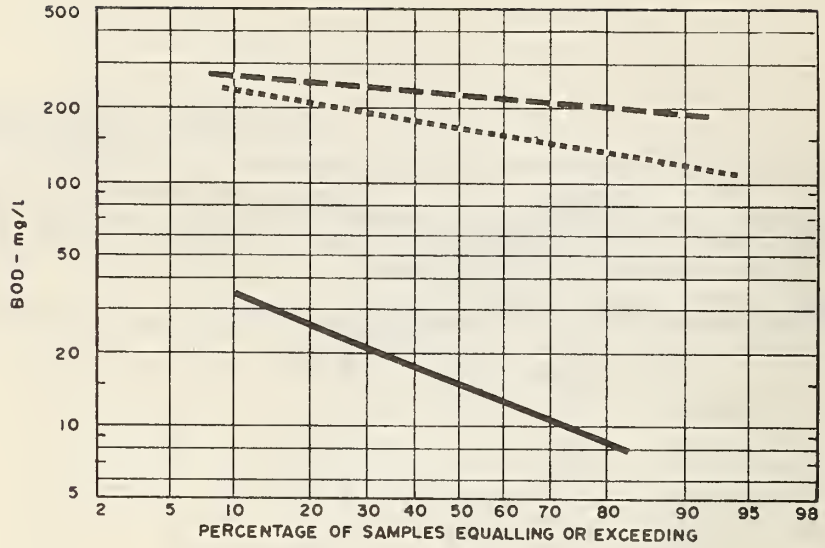
DESIGN CAPACITY _ _ _ _ _ _ _ _

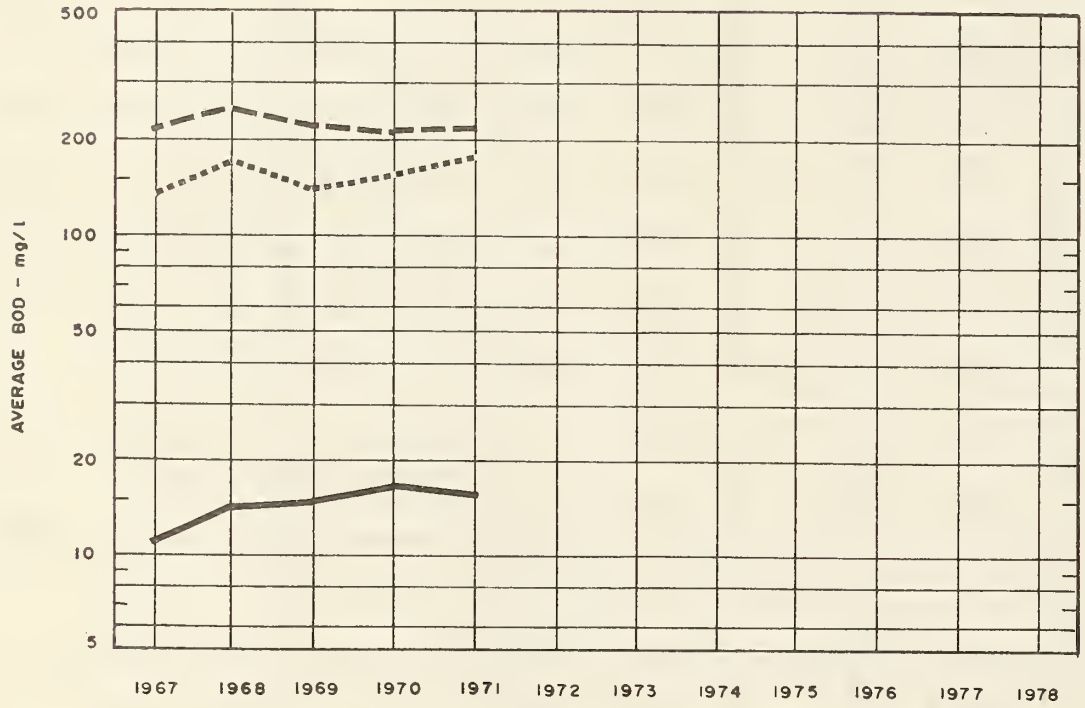
PLANT PERFORMANCE

MONTH	FLOWS				BIOCHEMICAL OXYGEN DEMAND				SUSPENDED SOLIDS				TOTAL PHOSPHORUS		
	TOTAL FLOW	AVERAGE DAY	MAXIMUM DAY	MAXIMUM RATE	INFLUENT	EFFLUENT	REDUCTION		INFLUENT	EFFLUENT	REDUCTION		INFLUENT	EFFLUENT	REDN
	million gallons	mil gal	mil gal	mgd	mg/l	mg/l	%	10^3 pounds	mg/l	mg/l	%	10^3 pounds	mg/l as P	mg/l as P	%
JAN	-	-	-	-	220	22	90	-	290	14	95	-	11.0	5.1	54
FEB	-	-	-	-	160	22	86	-	172	17	90	-	6.8	3.9	43
MAR	-	-	-	-	155	16	90	-	280	17	94	-	6.3	3.5	44
APR	-	-	-	-	250	22	91	-	163	13	92	-	10.1	3.2	68
MAY	24.2 a	1.7	2.4	2.8	200	14	93	90	155	8	95	70	12.0	6.0	50
JUNE	52.4	1.7	2.4	3.4	197	23	88	91	224	11	95	112	10.6	7.2	32
JULY	54.4	1.8	2.0	3.5	270	19	93	136	325	12	96	170	11.0	6.6	40
AUG	45.2	1.5	2.0	3.9	230	10	96	99	340	8	98	150	17.5	5.0	72
SEPT	44.0	1.5	1.7	3.2	250	7	97	107	264	9	97	112	11.5	6.6	43
OCT	45.6	1.5	1.9	3.0	250	15	94	107	231	8	96	102	13.0	7.5	42
NOV	43.0	1.4	1.7	3.0	196	14	93	78	158	8	95	64	11.0	10.0	9
DEC	54.9	1.8	2.5	3.9	280	30	89	137	315	5	98	170	11.0	-	-
TOTAL	584 est.	-	-	-	-	-	-	-	-	-	-	-	-	-	-
AVG.	-	1.6	MAXIMUM 2.5	MAXIMUM 3.9	209	16	92	106	249	12	95	119	11.0	6.0	45
No. of Samples	-	-	-	-	25	25	-	-	55	44	-	-	25	21	-

a - 14 day's flow

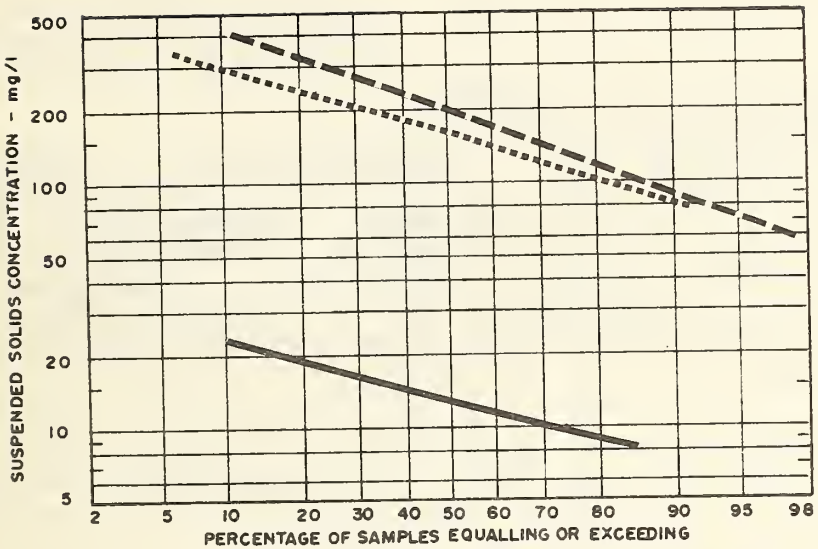
BIOCHEMICAL OXYGEN DEMAND

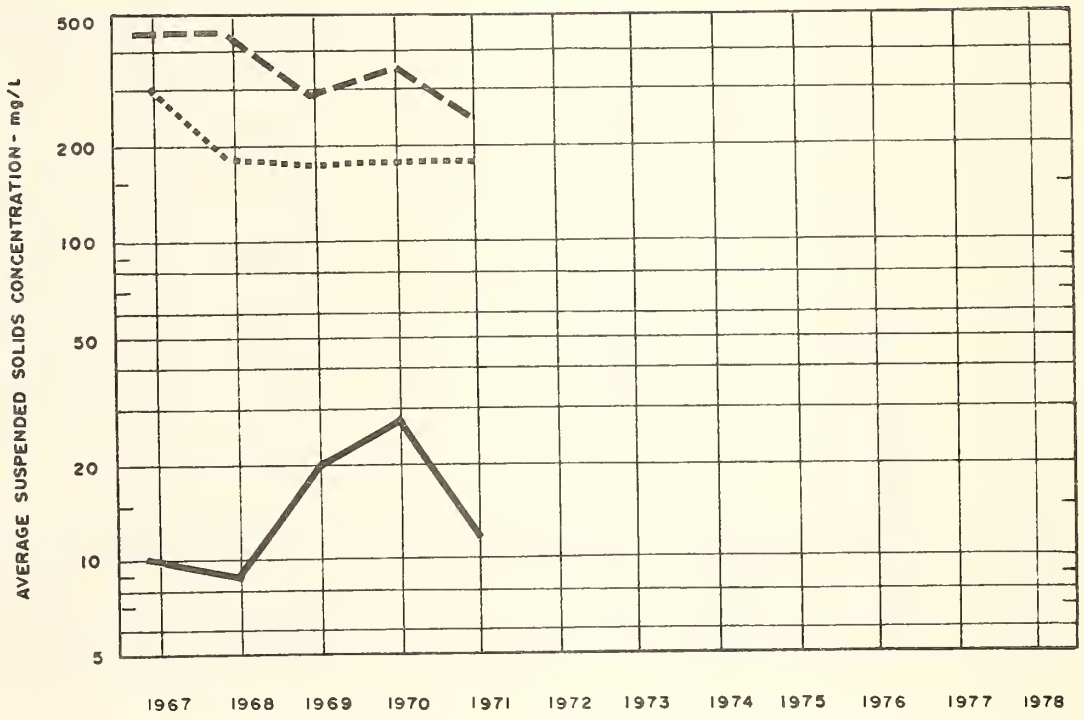




PLANT INFLUENT
PRIMARY EFFLUENT
PLANT EFFLUENT

SUSPENDED SOLIDS



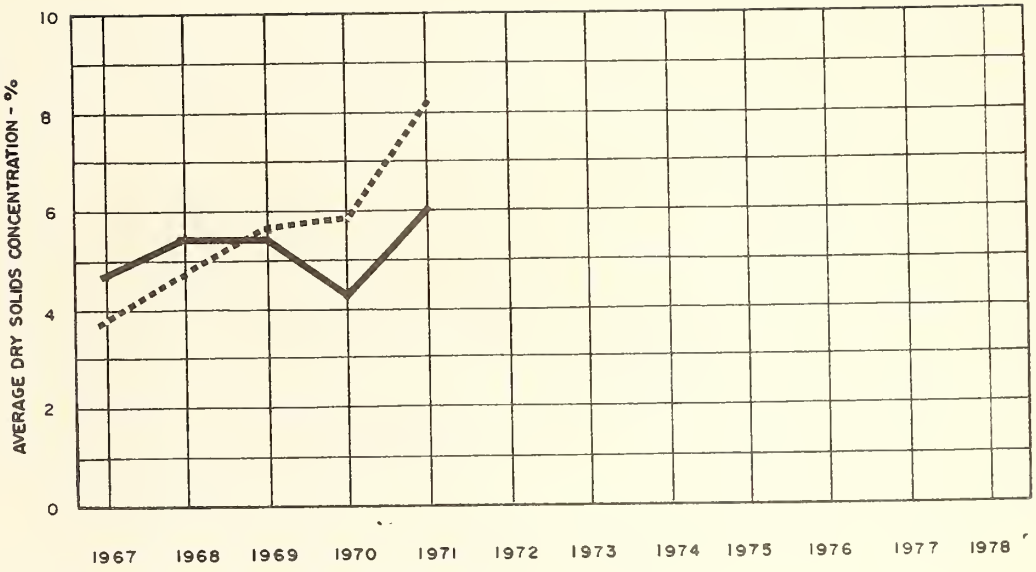


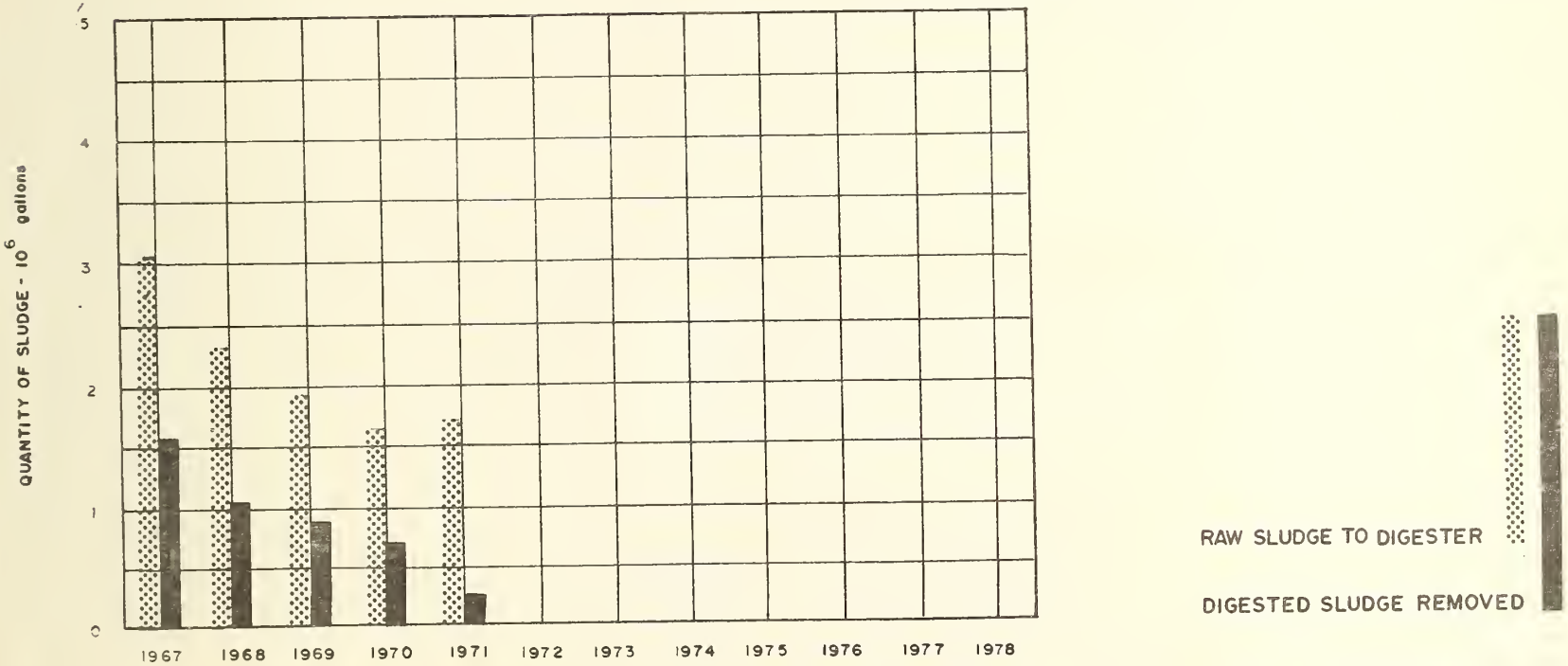
PLANT INFLUENT
PRIMARY EFFLUENT
PLANT EFFLUENT

TREATMENT DATA

MONTH	GRIT	CHLORINATION		PRIMARY EFFLUENT		AERATION			SLUDGE DIGESTION and DISPOSAL							
									RAW SLUDGE			DIGESTED SLUDGE			SUPER-	
	QUANTITY REMOVED	Cl_2 USED	AVG. DOSE	BOD	SUSPENDED SOLIDS	MLSS CONC	F/M	AIR	QUANTITY	TOTAL SOLIDS	VOL. SOLIDS	QUANTITY	TOTAL SOLIDS	VOL. SOLIDS	NATANT T.S.	AMOUNT HAULED
	cubic feet	pounds	mg/l	mg/l	mg/l	mg/l	day^{-1}	$\frac{1000\,ft^3}{lb\,BOD}$	10^3 gallons	%	%	10^3 gallons	%	%	%	cubic yards
JAN	15	-	-	210	168	2590	-	-	36	5.2	80	9	-	-	.9	54
FEB	6	-	-	367	385	2390	-	-	59	7.0	53	6	-	-	.1	37
MAR	36	-	-	115	236	2440	-	-	133	7.5	65	13	3.6	62	.2	79
APR	15	-	-	155	116	2520	-	-	182	6.2	68	19	3.9	60	-	111
MAY	14	490	2.4	160	175	2660	.12	1.0	127	-	-	25	7.2	-	-	147
JUNE	12	1190	2.2	163	139	2390	.15	.9	207	6.7	77	25	3.6	55	.5	147
JULY	23	970	1.8	181	178	2690	.15	2.2	142	8.0	76	19	3.1	56	3.0	112
AUG	16	1380	3.1	190	182	2060	.18	1.8	138	10.9	73	28	9.1	55	2.3	167
SEPT	15	1480	3.4	210	104	1830	.21	1.0	125	7.0	73	41	7.1	45	2.7	242
OCT	13	660	3.2	185	128	2040	.17	1.3	144	13.0	73	12	-	-	5.0	73
NOV	6	-	-	150	232	1750	.15	1.2	193	9.4	83	19	7.0	57	1.5	110
DEC	18	-	-	200	185	1860	.24	.7	221	10.5	78	18	9.0	56	1.5	109
TOTAL	189	6270	-	-	-	-	-	-	1707	-	-	234	-	-	-	1388
AVG.	.3 cu.ft/mil gal	1250	2.6	191	186	2270	.17	1.3	142	8.3	73	20	6.0	56	1.8	116

DIGESTION


AVERAGE DRY SOLIDS CONCENTRATION - %
0
2
4
6
8
10
1967
1968
1969
1970
1971
1972
1973
1974
1975
1976
1977
1978
RAW SLUDGE
DIGESTED SLUDGE


QUANTITY OF SLUDGE - 10^6 gallons
0
1
2
3
4
5
1967
1968
1969
1970
1971
1972
1973
1974
1975
1976
1977
1978
RAW SLUDGE TO DIGESTER
DIGESTED SLUDGE REMOVED